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5 The present invention discloses the application of
acoustic pressure waves and resulting vibrational energy
to atomize excess moisture and entrapped moisture in
hard to reach cracks and crevices, thus overcoming the
surface tensional forces and allowing increased
efficiency of the hot air dryers and the infrared
heaters. The acoustic pressure waves, generated by a
transducer and transferred to the module through the
air, will impinge the module at the angle proscribed and
10 not be substantially affected by the volume or velocity
of the hot air flow caused by the hot air dryers.

15 The present inventions further discloses the
application of vibrational energy through close
proximity to dry preferably planar tooling such as
stencils where heat is not desirable.

20 The present invention further combines the
enhancements of the print release portion of the present
invention, the cleaning portion of the present
invention, and the drying portion of the present
invention. The combination of at least two of the
contributors directs a method and apparatus forward for
utilizing screen printing technology for applying solder
bumps to IC die or wafers, resulting in a repeatable,
low cost solution.

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Brief Description of the Drawings

30 FIG. 1a through 1d describes the prior art,
presenting the features for screen printing solder
paste, and the like, onto a printed circuit assembly,
integrated circuit wafer, and the like.

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FIG. 2 teaches the limitations of the prior art, describing an aspect ratio.

FIG. 3 is a flow diagram showing the steps of the print release portion of the present invention.

FIG. 4 is a perspective view of a stencil showing a single aperture above an object and the desirable location for deposition of a material.

FIG. 5 is a cross sectional view that illustrates the forces exerted on the material during the preferred process to separate a stencil and an object.

FIG. 6 is a cross sectional drawing which illustrates two preferred methods of transferring the vibrational forces to the material and stencil to assist in the release process.

FIG. 7 is an isometric view of a test stencil used to validate the present invention.

FIG. 8 is a cross sectional view of a deposition of solder paste onto a receiving pad illustrating the advantages found during experimentation of the present invention.

FIG. 9 is a sectional side view of a stencil cleaner in the drying cycle in conjunction with the use of ultrasonic transducers.

FIG. 10 is a sectional side view of a solder stencil cleaning apparatus using vibrational energy for cleaning and drying.

FIG. 11 is a sectional side view of a solder stencil in conjunction with an under wiping system with the use of an ultrasonic transducer for drying.